

Quick Start Guide

1. Preface

The quick start guide is provided solely to help you get V15 wall mounted ultrasonic flow meter up and running as quickly as possible. For complete information about the flow meter and its detailed operation procedures, please refer to the User's Manual. Here we mainly introduce the flow meters quick using with clamp-on transducers.

A. Power supply

The power supply for RS485 keypad is 85-264VDC/24VDC.

B. Keys and Displays

The wall mounted ultrasonic flow meter has 4×4 tactile-feedback membrane keypad for parameters setting and 2×20 letters LCD display with backlight.

C. Window menu

In order to meet different condition of installing spots, we organize about one hundred of menus, but it is easy to operate and use. Users don't need to remember them, and we have made the classification as function.

How to reach a menu?

For example, user wants to check transducers installing distance, he need go to window menu 25 (named as M25). And just enter MENU key, then input 25, and press ENT key. It will be ok.

2. Quick Start Use Guide

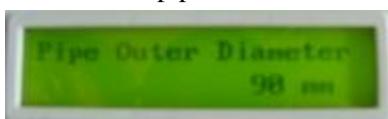
Step1. Power on

After well connecting power adapter, the meter is ON. The flow meter will go through a self-checking process to make sure everything is alright. After a second, the screen similar to the figure on the right will appear. If it doesn't, please write done the error message and contact the manufacturer immediately.

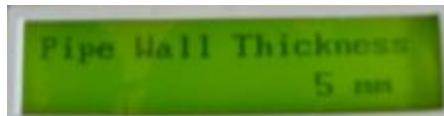
Step2. Configure the Measurement Settings

2.1 Enter pipe information

(1) **Pipe outer diameter:** press keys M11, and then **ENT** The display should be similar to the following figure. Now enter the pipe outer diameter, and press the **ENT** key to confirm.



(2) **Wall thickness:** press the **▼** key to scroll down to the next menu M12. Press **ENT** and enter the pipe wall thickness value. Press **ENT** again to confirm.



(3) **Pipe inner diameter:** press **▼** key to scroll down to M13. The correct value should be displayed on the screen. There is no need to change anything.

(4) **Pipe material:** press the **▼** key to scroll down to the next menu M14. Press **ENT** and use the **▼** key to select the right item. If pipe material is not shown on the list(non-standard material), select any one of them. Press **ENT** again to confirm.



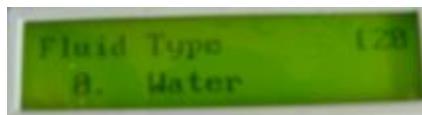
(5) **Sound Speed in pipe wall:** press the **▼** key to scroll down to menu M15. If you find your pipe material on the list in the previous step, the flow meter should already know the sound speed. You can just skip this step and go to the next.

Otherwise, press **ENT** and enter the sound speed of your pipe material. You can find this information in the User's Manual. When you are done, press **ENT** to confirm.

(6) **Pipe lining:** If your pipe has lining inside, enter the lining information on menu windows M16-M18.

2.2 Enter fluid information

(1) **Fluid type:** press the **▼** key to scroll down to menu M20, or simply press keys M20. Then, press **ENT** and select the item that matches your fluid type. If you do not find a match(non-standard fluid), just select any one of them. Press the **ENT** again to confirm.



(2) **Sound Speed in fluid:** If you find fluid type in the previous step, the flowmeter already has the sound speed information. Therefore, skip this step and go to the next. Otherwise, press the **▼** key to scroll down to menu M21. Press **ENT** and enter the sound speed of your fluid. You can find this information in the User's Manual. When you are done, press **ENT** to confirm.

2.3 Enter transducer installing information

(1) **Transducer type:** press the **▼** key to scroll down to menu M23, or simply press keys M23. Then, press **ENT** and select the item that matches your transducer type.

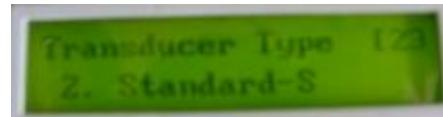
For orange color clamp-on transducers

For M1 type, select '16. Clamp-on TM1'

For S1 type, select '18. Clamp-on TS1'

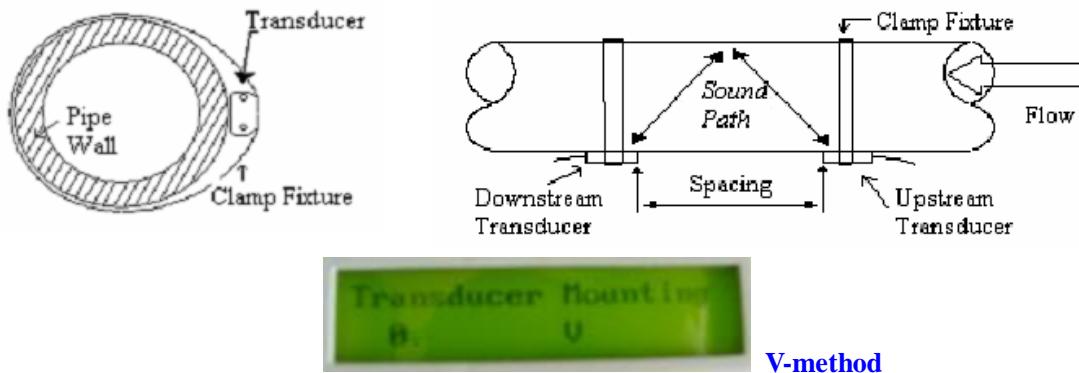
For L1 type, select '20.Clamp-on TL-1'

Then, press the **ENT** again to confirm.



(2) **Mounting method:** press the **▼** key to scroll down to menu M24, or simply press keys M24. Then, press **ENT** and select the proper item and press the **ENT** again to confirm.

For pipes smaller than 1', try W-method. For pipes from 1' to 12', use the V-method (see figure below). For pipes large than 12', use the Z-method.



(3) **Mounting space:** press the **▼** key to scroll down to menu M25, or simply press keys M25. The displayed value is the mounting spacing between the two transducers. (see the figure below). Write down this number, as you will need it later when installing the transducers.



Step3. Installing transducers

Please refer to parameters setting transducers installing manual.

Others refer to the Appendix for installing details.

Step4. Fine Tuning

On the main unit, press M90 to enter into menu M90. There are three important numbers displayed on this menu window (refer to the figure below): Transit-time ratio R, Signal Strength S, and Signal quality Q. Their value shall fall into the right ranges in order to justify the reading:

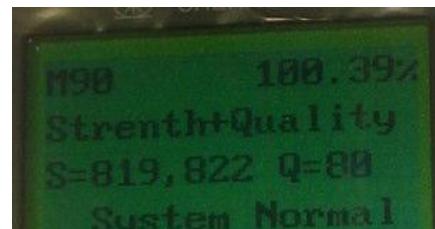
R: 97%~103%

S: 600~990

Q: 60~90

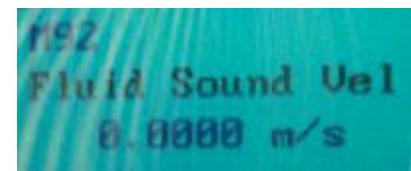
If these values are not in the above ranges, you need to verify the parameters you have

entered in step2. If you believe your entries are correct, and the three numbers are still of their ranges, you may need to check your installation. Here are some tips:



- Moving transducers closer to or away from each other will increase or decrease the transit-time ratio R.
- For small pipes (smaller than 1.5 inches), wrap some acoustic damping materials around the pipe, but leave an open window for transducers to make direct contact with pipe surface. Examples of damping material are Gracelce Water Shield materials, silicone rubber, epoxy, etc. Warning: be aware of their temperature limitations and other safety instructions.
- For smaller pipe (smaller than 1 inch), user can try W-method installation if flow meter can't get a proper performance.
- Make sure the transducer mounting area on the pipe is coating-free and smooth. Also, do not use excessive couplant on either transducer face or pipe surface.

The sound speed information in menu M92 might also be useful for debugging. The displayed value should be close to the one you have entered in step 2.3. If you have entered fluid type in step 2.3 instead, and you don't know the fluid sound speed, you can find this information in the Appendix of the User's manual.



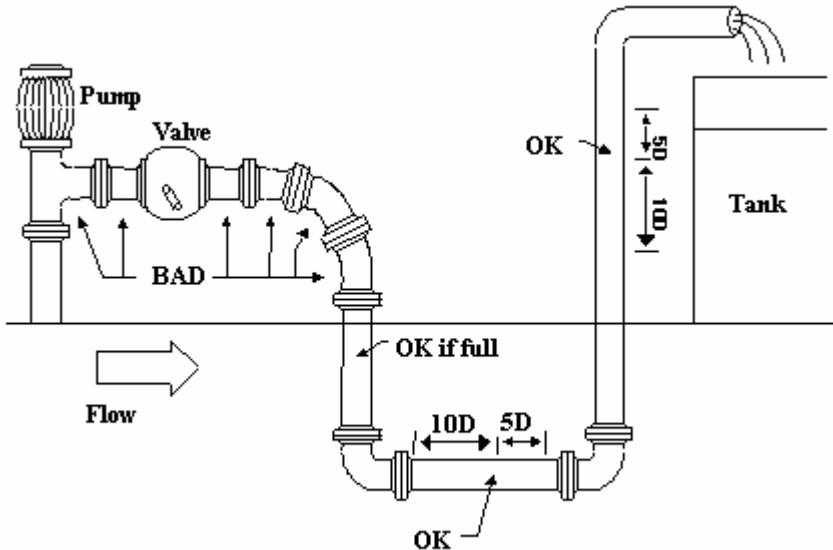
If all the three parameters are good, your installation is done. You are ready to look at your measurement results on menu window M00.

Note that the menu windows shown above are for illustration only. The values in those windows may not be meaningful.

Appendix-A: Transducer Installation Guide

A.1. Find the mounting site

- (A) Pipe must be full of liquids at the measurement site.
- (B) No heavy corrosion or deposition inside of the pipe
- (C) Must be a safe location
- (D) The straight run of the pipe must not be shorter than 15D as a general guideline, where D is the pipe diameter. Insufficient straight pipe length will degrade the accuracy of the result.
- (E) The transducer mounting site should be 10D straight run upstream and 5D straight run downstream. (see the following drawing.)
- (F) If there are flow disturbing parts such as pumps, valves, etc. on the upstream, the straight pipe length should be increased. The disturbance strength of those flow conducting parts will be (low to high):
Single Bend->Pipe Reduction/Enlargement->Outflow Tee->Same Plane Multiple Bends->Inflow Tee->Out of Plane Multiple Bends->Valve->Pump



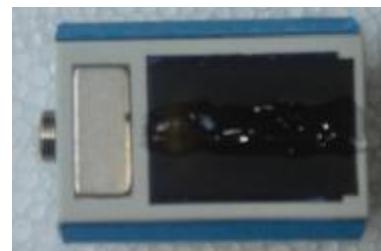
A.2. Prepare the Pipe Surface

Clean the pipe surface where the transducers will be mounted. Remove rust and paint. Sand the surface if not smooth. Use wet cloth to wipe off the power after sanding. Dry up the surface. A dry, clean surface will ensure a good acoustic bond between transducers and pipe.

A.3. Prepare the Transducer

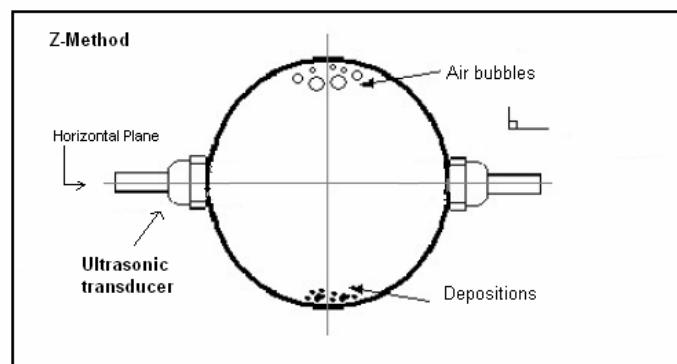
Clean the transducer surface. Keep the surface dry.

Put gel couplant on transducer surface as shown in the right figure. Do not put couplant more than necessary, especially for small pipe.



A.4. Prepare the Transducer

Notice: For horizontal pipe line, it is Recommended to install the transducers on the side instead of on the top or bottom of the pipe. This is to avoid air bubbles on the top and sediments on the bottom of the pipe.



A.4.1 Detailed installing of Transducer

Firstly, mark the transducer installation location on the pipe surface according to the mounting spacing displayed in menu M25. You may need to make a proper template to help you accurately locate the transducer position, especially if you plan to use Z-method for the installation.

Apply a small amount of couplant in the prepared area of the pipe where transducers will be in contact.

Slip the transducer under the clamp fixture. Tighten the screw. Do the same thing for the other transducer. Use the above figure as a reference.

Finally, connect the transducer cables to the main unit.



Appendix-B: Parameters solidifying and Saving/Loading

B.1 Parameters solidifying

MENU 26 allows for the solidification of any changes made-this menu should be checked and activated following any minor changes.

Press (enter) cursor 1 will flash and re-press (enter)-data will be saved to the non volatile memory.

B.2 Site Parameters Saving/Loading

M27 allow for up to 10 different site locations to be saved.

Press ENTER and the cursor site number will flash. Enter a site number 0 to 9 will allow the site parameters to be saved to that selected address (use the up/down arrows to select different sites)

Press Enter-this will allow the user to choose between:

0:-Load Parameters-will now allow you to choose a previously allocate site

Or

1:-Save parameters-save your settings to that site number.

Press ENTER and the menu will immediately go to the transducer spacing screen (menu25).

It is strongly recommended that you again solidify

any changes to the settings with menu 26.

Appendix-C : Installation Check-up

After the completion of transducer installation, the user should check the following items: the receiving signal strength S, the signal quality Q value, the delta time(traveling time difference between the upstream and the downstream signals),the estimated liquid sound speed, the transit time ratio R, and etc. As such, one can be sure that the flow meter is working properly and the results are reliable and accurate.

C.1. Signal Strength

Signal strength S indicates the amplitude of receiving ultrasonic signals by a 3-digit number [000] means there is no signal detected, and [999] refers to the maximum signal strength that can be received. Note that sometimes when no confusion will be introduced, S value is expressed by two digits(00-99) for simplicity.

Although the instrument works well when the signal strength ranges from 60 to 90, stronger signal strength should be pursued, because a stronger signal means a better result. The following methods are recommended to obtain strong signals:

- (1) If the current location is not good enough for a stable and reliable flow reading, or if the signal strength is lower than 60, relocate to a more favorable location.
- (2) Try to polish location the outer surface of the pipe, and apply more couplant to increase the signal strength.
- (3) Tenderly adjust the position of the two transducers, both vertically and horizontally, while checking the signal strength. Stop at the position where the signal strength reaches to maximum. Then, check the transducer spacing to make sure it is the same as or very close to what window menu M25 shows.
- (4) If the installation method is V-method and the pipe is big, you may need to try Z-method in order to get stronger signals.

C.2. Signal Quality

Signal quality is indicated as the Q value in the instrument. A higher Q value would mean a higher Signal to Noise Ratio(SNR), and accordingly a higher degree of accuracy able to be achieved. Under normal pipe condition, the Q value is in the range of 60-99, the higher the better.

Cause for a lower Q value could be:

- (1)Interference from other instruments and devices nearby, such as a power frequency transverter which could cause strong interference. Try to relocate the flow meter to a new place where the interference can be reduced.
- (2)Bad sonic coupling between the transducers and the pipe. Try to polish the pipe surface again, clean the surface and apply more gel couplant, etc.
- (3) The selected pipe section is difficult to conduct the measurement. Relocate to a more favorable pipe line.

C.3. Total Transit Time and Delta time

The total transit time(or traveling time) and the delta time are displayed on M93. They are the primary data for the instruments to calculate the flow rate. Therefore, the measured flow rate will vary as the total transit time and delta time vary.

The total transit time should remain stable or vary in a very small range.

The delta time normally varies less than 20%. If the variation exceeds 20% in either positive or negative direction, there could be certain kinds of problems with the transducers installation. The users should check installation for sure.

C.4. Transit Time Ratio

Transit-time ration R is usually used to check whether the transducer installation is good and whether the entered pipe parameters are in consistency with their actual values. If the pipe parameters are correct and the transducers are installed properly, the transit time ration should be in the range of $100 \pm 3\%$. Particularly, when the flow is stand-still, the ratio should be very closed to 100%. If this range is exceeded, the user should check:

- a) If the entered pipe parameters are correct?
- b) If the actual spacing of transducers is the same as or close to what shown on window M25?
- c) If the transducer are installed properly in the right direction?
- d) If the mounting location is good, if the pipe has the changed shape, or if the pipe is too old(i.e., too much corrosion or deposition inside the pipe)?
- e) If there is any interference source inside of the pipe?
- f) If there are other aspects which don't meet the measurement requirements as recommended earlier?

Appendix-D: When Meeting Problems or Troubles

When meeting problems, firstly you should switch menu to menu 90 and menu 91. Check the readings of the triplet(signal strength S, signal quality Q and transit-time ratio R). Make sure they are at least in the operational ranges:

$$S \geq 60, Q \geq 60, \quad 103\% \geq R \geq 97\%$$

In ideal case where pipe condition and fluid condition are favorable for sound propagation, the triplet readings could be fine turned into the optimal ranges. If your reading are not close to their optimal ranges, or, even not in their operational ranges, you need to adjust your transducer installation slightly and slowly, until you get the best readings.

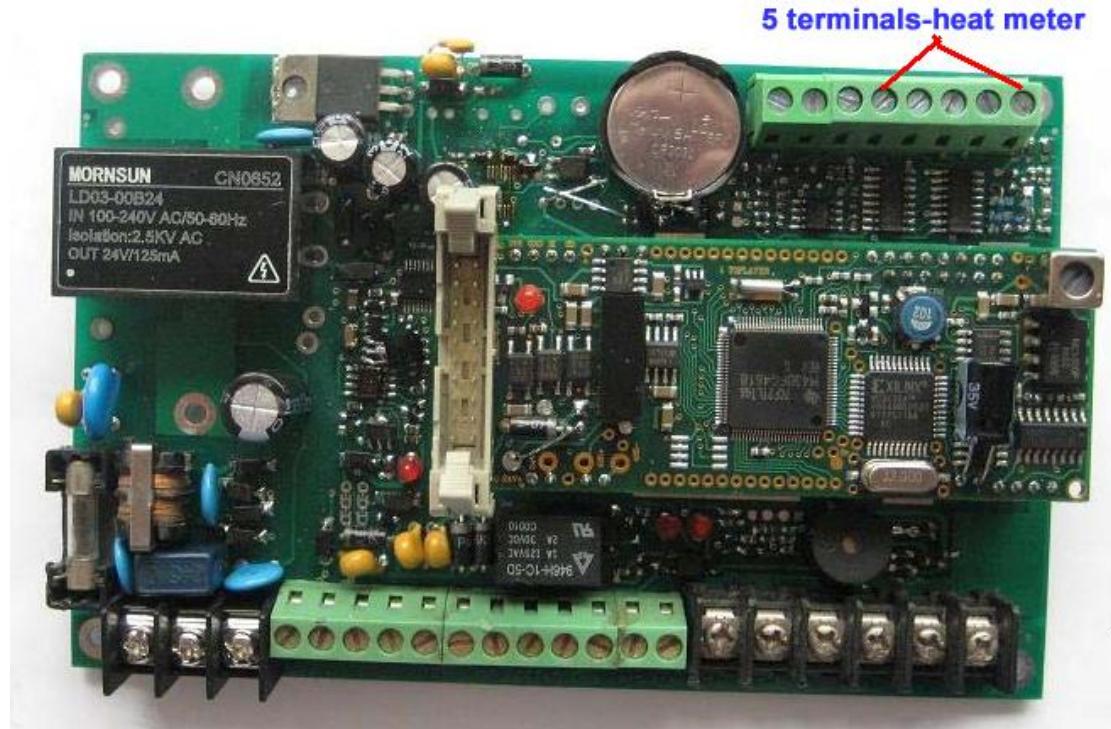
If you are unable to get the triplet into their operational ranges, no matter how hard you try, then, you may need to check all the parameters you entered in menu windows M11 to M24. Make sure those values are correct. Whenever you make a change to those parameters, you need to check the transducer spacing reading in menu M25. If the spacing is changed, you need to re-install the transducers accordingly.

If you still cannot get the right triplet readings, check the following:

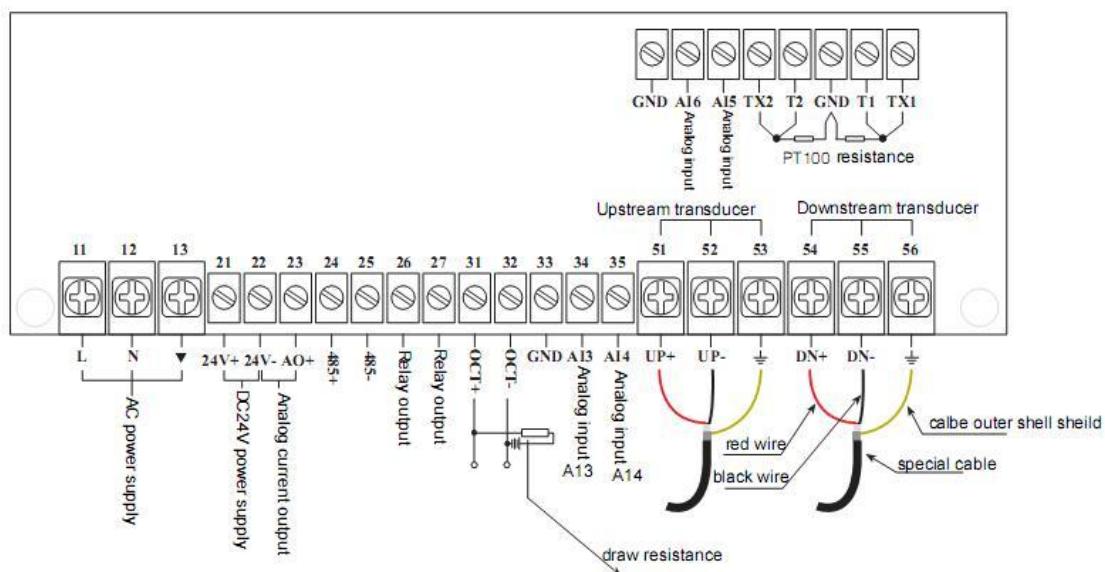
- Is the pipe too old?
- Too much deposition inside of the pipe?
- Too much corrosion? Too much air bubble?
- Too thick liner? Empty or half-full pipe?
- Too close to pump/valve/elbow?

Appendix-F: When Meeting Problems or Troubles

F.1. V15 wall mounted unit PCB picture



F.2. V15 wall mounted unit PCB wiring diagram



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